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In the Drawings:

None

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This amendment is in response to the Examiner's Office Action dated 9/21/2004. Claim 12 has been amended to clarify applicants' invention without adding new matter. Minor amendments have been made to pending claim 13 to correct antecedent issues without adding new matter. Claims 18-19 have been newly added without adding new matter. Limitations associated with newly added claims 18-19 can be found in figures 1a-b, 2, 3a-b, 4, 6, 7, 9, 15, 16, 17, and 18 of the application-as-filed, corresponding parts of the specification-as-filed, and previously presented claim 12. This amendment should obviate outstanding issues and make the remaining claims allowable. Reconsideration of this application is respectfully requested in view of the foregoing amendment and the remarks that follow.

STATUS OF CLAIMS

Claims 12 and 13 are pending.

Claims 12-13 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and claim the subject matter which applicant regards as the invention.

Claims 12-13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Gilhousen in view of Ichihara et al.

Claims 18-19 have been newly added without adding new matter.

OVERVIEW OF CLAIMED INVENTION

The presently claimed invention provides for a radio receiver for measuring direction of a receiver as seen from a base-station transmitter comprising a demodulator, a phase-difference calculation unit, and a direction calculation unit. The demodulator receives and demodulates

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first and second signals, which have been spread by mutually orthogonal spreading codes and transmitted from antennas that are disposed at different points in a base station, wherein the distance between the antennas is D. The phase-difference calculation unit calculates a phase difference between the first and second signals transmitted from respective antennas, and the direction calculation unit calculates the direction of the receiver (as an angle which the vertical direction serving as a reference forms with a direction of a straight line connecting the antennas) using the calculated phase difference and said distance D.

The present invention also provides for a radio receiver for measuring direction of a receiver comprising a demodulator, a phase-different calculation unit, and a direction calculation unit. The demodulator receives and demodulates first and second signals transmitted by time sharing from antennas that are disposed at different points in a base station, wherein the distance between the antennas is D. The phase-different calculation unit calculates a phase between the first and second signals transmitted from respective antennas, and the direction calculation unit calculates the direction of the receiver (as an angle which a vertical direction serving as a reference forms with a direction of a straight line connecting said antennas) using the calculated phase difference and the distance D.

In the Claims

DOUBLE PATENTING REJECTION

Claims 12 and 13 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-13 of U.S. Patent 6,577,273 to Hamada et al. Applicants have hereby filed a terminal disclaimer in compliance with 37 C.F.R. 1.321(c) as the conflicting patent to Hamada et al. is commonly owned by Hitachi. Applicants hereby

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respectfully request the examiner to withdraw the double patenting rejection of claims 12-13. It should, however, be noted that the request to withdraw the rejections regarding claims 12-13 does not indicate that the applicants acquiesce with the arguments put forth by the Examiner.

REJECTIONS UNDER 35 U.S.C. § 112, second paragraph

The examiner has rejected claims 12-13 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and claim the subject matter which applicant regards as the invention. Claims 12-13 have been amended to clarify applicants' invention. The examiner is hereby respectfully requested to withdraw the 35 U.S.C. § 112 rejections with respect to claims 12-13.

REJECTIONS UNDER 35 U.S.C. § 103(a)

Claims 12-13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Gilhousen (6,195,046), hereafter Gilhousen, in view of Ichihara et al. (3,789,408), hereafter Ichihara. To be properly rejected under 35 U.S.C. § 103(a), each and every element of the claims must be addressed through known prior art or be recognized as an obvious variation thereof. Applicants contend that the Gilhousen reference, either by itself or in combination with the Ichihara reference, fails to provide for many of the limitations of the applicants' claimed invention.

Gilhousen teaches a mobile radio positioning system in which a base station having transmit-only slave antennas is used for determining a position of a mobile station. According to the description of figure 3 of the Gilhousen reference, three slave antennas are located within approximately a few hundred feet of a master base station antenna. These slave antennas in

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conjunction with the master antenna transmit different CDMA signals to a mobile station. The mobile station measures the reception time of signals transmitted from the slave antennas and the master antenna and calculates arrival time differences between the master signal reception time and each slave signal reception time. Then, the arrival time differences are used to calculate at least two hyperbolic lines of position. Thereafter, the system identifies one intersection between these hyperbolic lines as a position of the mobile station.

Ichihara relates to a synchronous system in which a comparator detects time difference or phase difference between an incoming signal and a reference signal, whereby a phase shifter shifts the reference signal so that the phase difference is cancelled.

With respect to claims 12 and 13, on page 3 of the office action of 09/21/2004, the examiner states that many of the limitations (except for the limitation of the relationship between the time difference/phase difference in determining direction) are provided for by figure 3 of the Gilhousen reference. As mentioned earlier, figure 3 of the Gilhousen patent teaches the calculation of "at least two hyperbolic lines of position" using "arrival time differences" (see figure 3, step 350; column 9, lines 1-50 of Gilhousen). However, applicants wish to note that the Gilhousen reference does not teach or suggest the limitation of measuring a phase difference and detecting a direction of a receiver using a phase difference. Furthermore, applicants also wish to note that the Gilhousen reference does not teach or suggest the limitation of calculating a direction of a receiver using both a calculated phase difference and a distance, D, between antennas disposed at different points in a base station.

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In page 3 of the office action of 09/21/2004, the examiner states that "Ichihara et al. teach that the relationship between the time differences and phase differences in determining direction are well-known." Applicants, however, contend that the Ichihara reference merely teaches "shifting the phase of each segment of the reference signal" whereby "the phase difference is cancelled before the next signal is received" (see abstract, and column 1, line 58-column 2, line 8). But, the Ichihara reference is silent regarding the limitation of detecting a direction of a receiver based upon phase difference. Furthermore, the Ichihara reference is also silent regarding the limitation of calculating a direction of a receiver using both a calculated phase difference and a distance, D, between antennas disposed at different points in a base station.

Hence, with regards to claims 12-13, applicants contend that an improper rejection was made under 35 U.S.C. § 103(a) using the Gilhousen and Ichihara references, as the references, used individually or in combination, fail to at least teach the limitation of calculating direction of the receiver using the phase difference and distance D between two antennas provided on a base station. Applicants, therefore, respectfully request the examiner to withdraw the 35 U.S.C. §103(a) rejection with regards to claims 12-13. Reconsideration of this application is respectfully requested in view of the foregoing amendment and the above-presented remarks.

SUMMARY

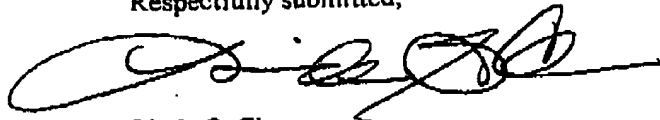
As has been detailed above, none of the references, cited or applied, provide for the specific claimed details of applicant's presently claimed invention, nor renders them obvious. It is believed that this case is in condition for allowance and reconsideration thereof and early issuance is respectfully requested.

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This amendment is being filed with a petition for extension of time. The Commissioner is hereby authorized to charge the petition fee, as well as any deficiencies in the fees provided to Deposit Account No. 50-1290.

If it is felt that an interview would expedite prosecution of this application, please do not hesitate to contact applicant's representative at the below number.

Respectfully submitted,



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